Estimating Farm Machinery Repair Costs

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A custom operator recently asked whether the repair component of the extension machinery cost estimates accurately reflects the occasional large repair bill for something like an engine or transmission break. The short answer is "yes." The estimates are intended to cover total repair and maintenance expenses including what one can expect to pay on average for major breakdowns. Of course, not every machine will blow an engine, so for any particular machine the actual repair cost might be greater or less than the estimates. There is a bit more to the story, however.

Accurate estimates of farm machinery ownership and operating costs are important for pricing custom work, calculating crop breakeven prices and other management decisions. The economic engineering approach extension economists use to estimate machinery operating costs is sometimes called the DIRTI-5 approach, which stands for the main cost components of Depreciation, Interest, Repairs, Taxes and Insurance.

Repairs are probably the most difficult of these costs to estimate. The purpose of this article is to discuss how most farm management economists go about estimating repairs and to suggest a new tool producers can use to arrive at accurate repair cost estimates for their own farm/business. Repair costs in the DIRTI-5 approach are normally estimated using equations that are regularly reviewed and maintained by a machinery management committee of the American Society of Agricultural and Biological Engineers (ASABE). The equations are published in a technical library of standards for agricultural engineers to use.

The empirical data on which these repair equations are based is quite old. In 1966, agricultural engineers Bowers and Hunt surveyed around 1,800 farmers in Illinois and Indiana and used that data to develop equations. The equations were revised by Rotz and Bowers in 1991 based on expert opinion (additional surveys were not completed). Obviously, machinery has changed significantly since the 1966 survey. The equations estimate repair costs as a percentage of the machine purchase price, so the equations should remain valid as long as the machine purchase prices rise at the same rate as the cost of repairs. But, that is not known for sure. Funding has not been available to do extensive research in this area.

One reason repair costs have been somewhat neglected by engineers and economists may be due to a notion that repair costs are a small percentage of total machinery costs compared to other items like depreciation and, more recently, fuel. Therefore, inaccuracies in repair costs may not affect total costs significantly. However, repairs are still expensive for custom operators and larger farms so it bears further scrutiny.

Most producers and custom operators have some sense of the total amount spent annually on repairs and maintenance because it is a deductible expense on income tax Schedule F. The difficult question is how that total annual farm cost breaks down to a per acre or per hour cost for a particular machine used on a particular crop.

Those interested in estimating these costs for their machinery inventory can use the Excel spreadsheet available at http://www.apec.umn.edu/faculty/wlazarus/interests-farmmachinery.html. The spreadsheet uses the ASABE equations to estimate costs and then adjusts the costs to be consistent with actual Schedule F totals.

The spreadsheet requires a producer or operator to enter three numbers for each tractor, self-propelled forage harvester or combine – its age, how many hours its used in a typical year and an estimated list price for a similar new machine.

For implements, enter acres per year rather than hours and how many acres covered per hour. Final information needed is to choose the closest ASABE equipment category for each machine. The spreadsheet then calculates the repair cost per year and per hour or per acre for each machine and the total for the farm.

Producers or operators should compare the estimated repair costs to the totals on their Schedule F forms. For further information, email the author at wlazarus@umn.edu or call 612-625-8150 to discuss in greater detail.